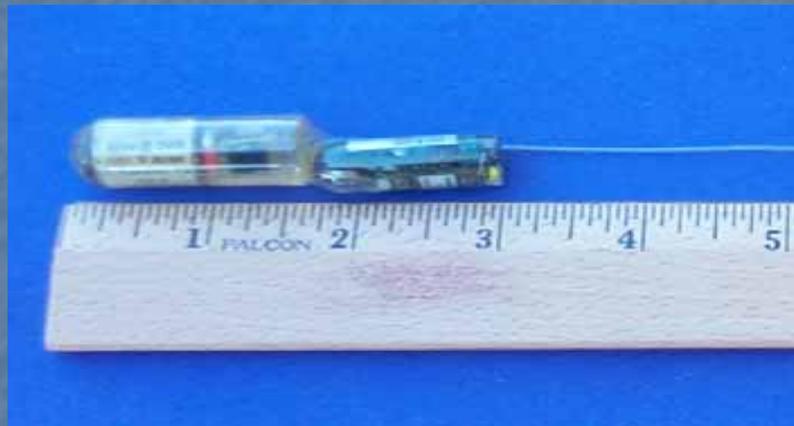


# CHINOOK SALMON MIGRATION PATTERNS AND HOLDING CHARACTERISTICS



SP-F10 TASK 1E

# Introduction

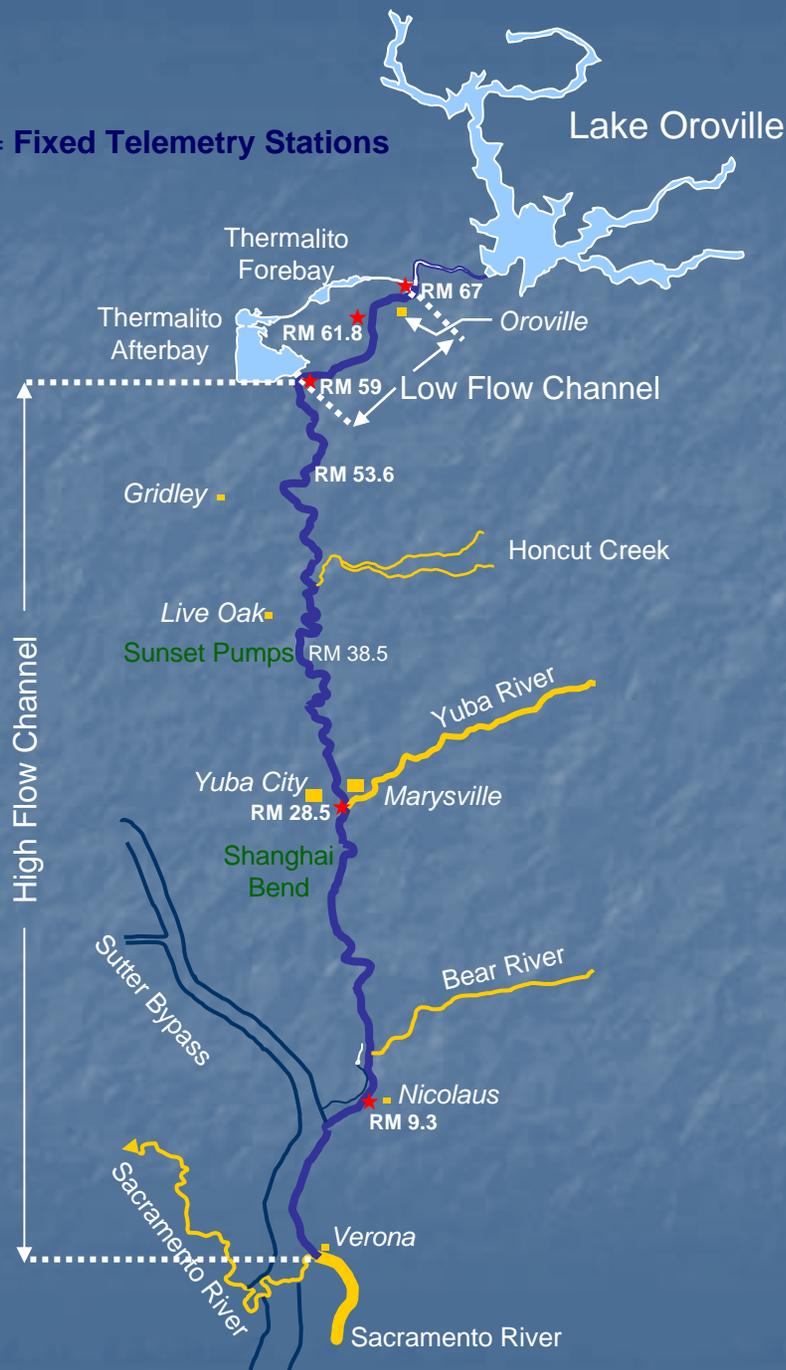
Tag Chinook salmon to assess:

- Holding habitat preferences
- Migration patterns
- Use of area downstream of Outlet

# Objectives

- Compare water temperature use with recommended temperatures
- Analyze migration patterns including Thermalito Afterbay Outlet influences.

★ = Fixed Telemetry Stations



# Methods

- Began July 9
- Combination radio/archive tags
- Manual tracking and 5 fixed stations

# Results

- 16 of 18 fish relocated
- 6 harvested
- 2 of 3 that entered hatchery spawned
- 5 of 7 detected in spawning grounds
- 7 tags recovered

Summary information on Chinook salmon captured for the 2003 telemetry study. Grey rows indicate tagged fish that were never relocated after release.

| Fish # | Tag Date | Release Time | Release Location | River Mile | Tag Code | FL  | Sex | Recovery Date | Recovery Location | Tag returned |
|--------|----------|--------------|------------------|------------|----------|-----|-----|---------------|-------------------|--------------|
| 1      | 7/9/03   | 1100         | Yuba City        | 28.5       | 76       | 710 | N/A |               |                   |              |
| 2      | 7/30/03  | 610          | Big Riffle       | 53.6       | 78       | 940 | M   | 9/8/03†       | Outlet            | No           |
| 3      | 7/30/03  | 640          | Big Riffle       | 53.6       | 81       | 940 | F   | 10/2/03       | Hatchery          | Yes          |
| 4      | 7/30/03  | 750          | Big Riffle       | 53.6       | 84       | 820 | F   |               |                   |              |
| 5      | 7/30/03  | 900          | Big Riffle       | 53.6       | 79       | 900 | F   | 8/18/03       | Outlet            | Yes          |
| 6      | 8/1/03   | 745          | Big Riffle       | 53.6       | 68       | 760 | F   |               |                   |              |
| 7      | 8/1/03   | 925          | Big Riffle       | 53.6       | 54       | 860 | F   | 8/17/03       | Outlet            | Yes          |
| 8      | 8/1/03   | 1020         | Big Riffle       | 53.6       | 88       | 720 | F   | 9/8/03        | Hatchery          | Yes          |
| 9      | 8/1/03   | 1105         | Big Riffle       | 53.6       | 87       | 880 | M   | 8/14/03       | LFC               | Yes          |
| 10     | 8/4/03   | 550          | Big Riffle       | 53.6       | 86       | 920 | F   |               |                   |              |
| 11     | 8/4/03   | 645          | Big Riffle       | 53.6       | 50       | 880 | F   |               |                   |              |
| 12     | 8/4/03   | 730          | Big Riffle       | 53.6       | 83       | 840 | M   |               |                   |              |
| 13     | 8/4/03   | 850          | Big Riffle       | 53.6       | 52       | 870 | M   | 8/9/03        | Outlet            | No           |
| 14     | 8/4/03   | 1000         | Big Riffle       | 53.6       | 72       | 810 | M   | 10/1/03       | Hatchery          | Yes          |
| 15     | 8/6/03   | 710          | Big Riffle       | 53.6       | 56       | 860 | M   |               |                   |              |
| 16     | 8/6/03   | 735          | Big Riffle       | 53.6       | 62       | 790 | F   |               |                   |              |
| 17     | 8/7/03   | 735          | Big Riffle       | 53.6       | 82       | 780 | F   | 8/24/03       | unknown           | Yes          |
| 18     | 8/7/03   | 825          | Big Riffle       | 53.6       | 69       | 860 | F   |               |                   |              |

† Fixed station data indicates this fish was in the system after the recapture date. Tag number may have been misidentified by angler- unable to verify.

# Water Temperature

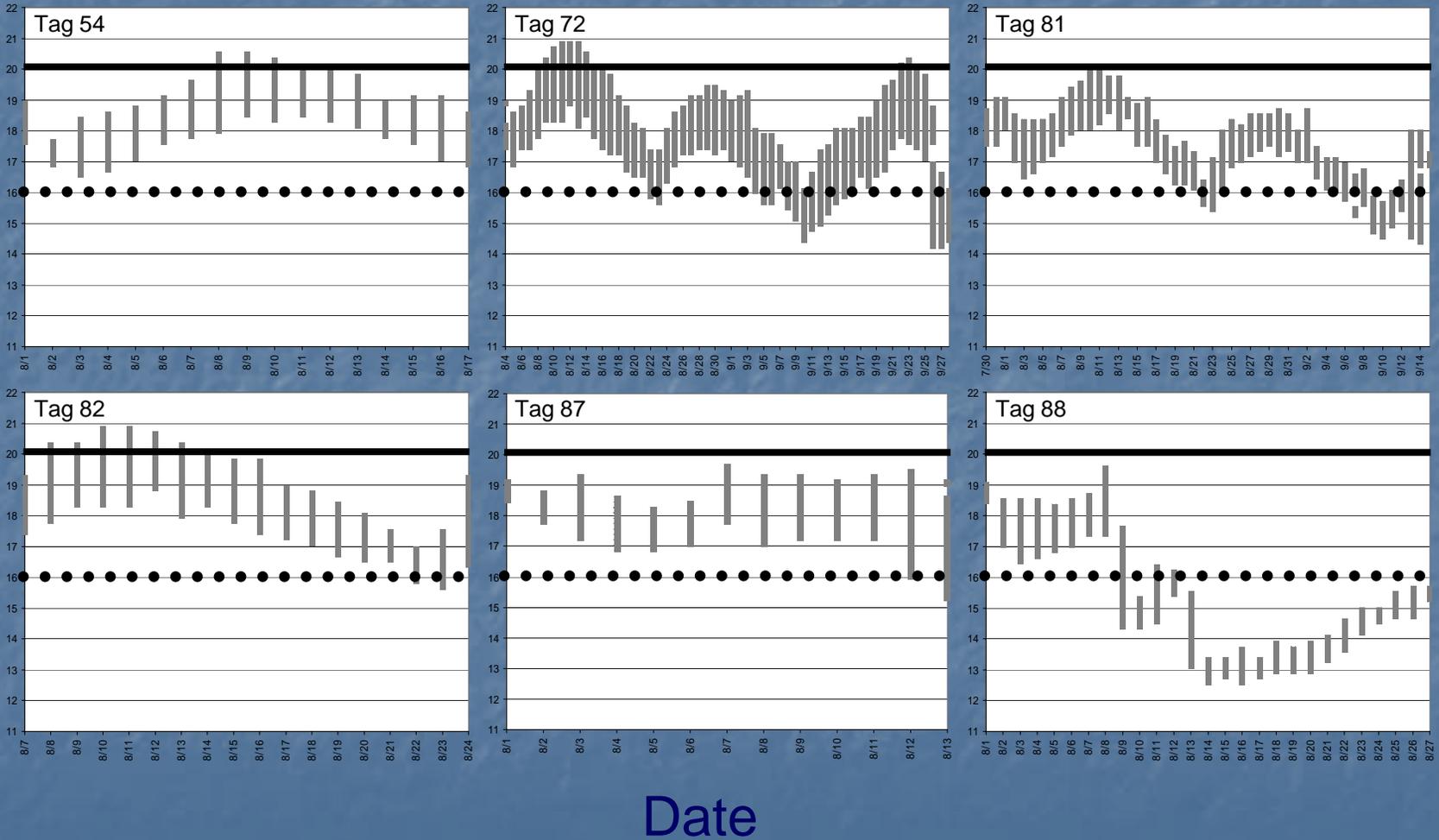
Tagged fish were recorded between 12.8-20.8°C

Frequency of water temperature use by Chinook salmon in the lower Feather River during the 2003 telemetry study.

| Temperature °C          | Tag 54 | Tag 72 | Tag 81 | Tag 82 | Tag 87 | Tag 88 |
|-------------------------|--------|--------|--------|--------|--------|--------|
| < 16                    | 0.0%   | 12.2%  | 10.6%  | 2.4%   | 1.2%   | 67.2%  |
| <u>&gt;</u> 16 and < 20 | 95.0%  | 84.9%  | 89.4%  | 89.5%  | 98.8%  | 32.8%  |
| <u>&gt;</u> 20          | 5.0%   | 2.9%   | 0.0%   | 8.1%   | 0.0%   | 0.0%   |

Temperature profiles of individual Chinook salmon. Note **—** = estimated maximum thermal limit and **••••** = suggested migration temperature.

Temperature (°C)



# Depth

Frequency of time Chinook salmon spent at varying holding depths during the 2003 telemetry study.

| Depth (m)           | Tag 72 | Tag 81 | Tag 87 |
|---------------------|--------|--------|--------|
| $\leq 2$            | 6.4%   | 3.9%   | 30.7%  |
| $> 2$ and $\leq 5$  | 43.4%  | 28.3%  | 66.1%  |
| $> 5$ and $\leq 10$ | 50.1%  | 52.4%  | 3.2%   |
| $> 10$              | 0.0%   | 15.4%  | 0.0%   |

# Migration Patterns

Migration patterns for individual Chinook salmon. Note : \* = not relocated after tagging. (H) = harvested by anglers at Thermalito Outlet.

| Tag # | At Large† | Total (RM) | Net (RM) | Last Location (RM), date | Rate (RM/day) | Days at 59†† |
|-------|-----------|------------|----------|--------------------------|---------------|--------------|
| 50    | 136       | 21.6       | 12       | 60, Dec. 18              | 0.16          | 2            |
| 52    | 5         | 5.4        | 5.4      | 59, Aug. 9               | 1.08          | 4 (H)        |
| 54    | 16        | 10.6       | 8        | 59, Aug. 17              | 0.66          | 1 (H)        |
| 56    | 146       | 11.6       | 8.8      | 61.8, Dec. 30            | 0.10          | 2            |
| 62    | 139       | 21.2       | 13.5     | 61.8, Dec. 30            | 0.15          | 42           |
| 68    | *         | *          | *        | *                        | *             | *            |
| 69    | 103       | 26.6       | 14.8     | 63, Nov. 18              | 0.26          | 2            |
| 72    | 55        | 11         | 9.6      | 61.8, Oct. 1             | 0.20          | 1            |
| 76    | *         | *          | *        | *                        | *             | *            |
| 78    | 59        | 38.2       | 22.5     | 67, Sept. 27             | 0.65          | 4 (H)        |
| 79    | 19        | 13.2       | 8.2      | 59, Aug. 18              | 0.69          | 4 (H)        |
| 81    | 52        | 13.4       | 13.4     | 67, Oct. 2               | 0.26          | 19           |
| 82    | 11        | 1.4        | 1.4      | 52.2, Aug. 24            | 0.13          | 0            |
| 83    | 141       | 38.2       | 15.5     | 59, Dec. 23              | 0.27          | 33           |
| 84    | 45        | 82.7       | 44.3     | 9.3, Sept. 13            | 1.84          | 0            |
| 86    | 14        | 7.4        | 5.4      | 57, Aug. 18              | 0.53          | 1            |
| 87    | 12        | 8.2        | 8.2      | 61.8, Aug. 14            | 0.68          | 4            |
| 88    | 24        | 13.4       | 13.4     | 67, Sept.8               | 0.56          | 2            |

† At large equals the amount of days between date of being tagged and date of recapture/last detection

†† Days at 59 equals the total number of nonconsecutive days the fish was detected at the Thermalito Afterbay Outlet while at liberty

# Conclusions

- Used 16-20° C water 2-10 meters deep
- Compare with SP-W6 results
- Over 90% of the fish upstream of Gridley
- Thermalito Outlet has a high harvest rate and may temporally influence Chinook